

Appl. No. 10/604,916  
Amdt. dated October 11, 2004  
Reply to Office action of August 12, 2004

**Amendments to the Specification:**

*Please replace paragraph [0002] with the following amended paragraph:*

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[0002] The present invention relates to a portable dryer, ~~and more and more~~ particularly, to a multiple-setting portable dryer and related circuit designs.

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*Please replace paragraph [0004] with the following amended paragraph:*

[0004] The conventional dryer is operable only after establishing connection with an AC power plug through a power cord. The use of the  
15 dryer is then limited by the length of the cord to the area that can be reached by the cord from the AC power receptacle. Therefore, it is very inconvenient for travelling ~~purposes, in~~ purposes, in particular, when traveling in countries where the AC power specifications, such as voltages, cycles, and ~~receptacles vary~~ receptacles vary from one to another.  
20 Different converters and transformers are needed if the user wants to use a conventional dryer. Furthermore, since the conventional AC powered dryers are powered by AC currents with sinusoidal amplitudes, most use a diode to control the generation of heat. When the switch is shifted to low heat, the one-way conduction property of the diode filters out a half cycle  
25 of the AC current that passes through the heating filament. When the switch is shifted to high heat, the current to the heating filament does not go through the diode so that heat can be generated in full output. At the same time, in order to provide a DC current to the motor, an additional bridge rectifier has to be employed to supply the needed DC power.

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*Please replace paragraph [0005] with the following amended paragraph:*

- 5 [0005] A typical portable dryer is disclosed in US 6,327,428, which is incorporated herein by reference. The portable dryer comprises a plurality of heating ~~filaments for generating~~ filaments for generating different levels of heat. ~~A heat. A~~ A motor of the portable dryer is capable of running at different speeds so that a fan of the portable ~~dryer can~~ dryer can blow  
10 different volumes of air and heat for the convenience of the user.

*Please replace paragraph [0006] with the following amended paragraph:*

- [0006] It is a primary object of this invention to provide ~~a multiple-setting a~~  
15 multiple-setting portable dryer having advantageous circuit designs.

*Please replace paragraph [0007] with the following amended paragraph:*

- 20 [0007] According to one embodiment of the invention, the portable dryer includes a housing, a power unit for supplying electric ~~power to~~ power to the portable dryer, a motor having a fan installed inside the housing, four heating filaments electrically connected to the power ~~unit for~~ unit for generating heat, and a switch electrically connected to the power unit.  
25 When the portable dryer operates, the power unit supplies electric power to the motor and the heating filaments, causing the heating filaments to generate heat, and the motor to drive the fan and thus blow out hot air generated by the heating filaments. When the switch is turned to a first operation position, the motor electrically connects to a first heating

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filament in series and then to a third heating filament in parallel. When the switch is turned to a second operation ~~position, both position, both~~ the first heating filament and a second heating ~~filamentare filament~~ are electrically  
5 connected in ~~parallel and parallel and~~ electrically connected to the ~~motorin motor in~~ series and then to the third heating filament and a fourth heating filament in ~~parallel. Therefore parallel. Therefore,~~ the speed of the motor can be controlled by the switch to obtain different levels of airflow and heat.

10

*Please replace paragraph [0008] with the following amended paragraph:*

[0008] In another embodiment of the present invention, when the switch is  
15 turned to the second operation position, the first heating filament is electrically ~~disconnectedto disconnected to~~ the power unit, and the motor electrically connects to the second heating filament in series and then to both the third heating filament and the fourth heating filament in parallel.

20

*Please replace paragraph [0009] with the following amended paragraph:*

[0009] In another embodiment of the present invention, when the switch is turned to the second operation position, the ~~thirdheating third heating~~  
25 filament is electrically ~~disconnectedto disconnected to~~ the power unit, and both the first heating filament and the second heating ~~filamentare filament~~ are electrically connected in parallel and parallel and electrically connected to the motor in series and then to the fourth heating filament in parallel.

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*Please replace paragraph [0010] with the following amended paragraph:*

- 5 [0010] In another embodiment of the present invention, when the switch is turned to the second operation position, the ~~first heating filament and first~~ heating filament and the third heating filament are electrically ~~disconnected to filament~~ are electrically disconnected to the power unit, and the motor electrically connects to the second heating filament in series  
10 and then to the fourth heating filament in parallel.

*Please replace paragraph [0023] with the following amended paragraph:*

- 15 [0023] Please refer to Fig.1, which is a schematic view of a portable dryer 10 according to the present invention. The portable dryer 10 has a housing 1 with an opening 11 on one end thereof, a power unit 6 installed in the housing 1 for supplying electric power to power to the portable dryer 10, a motor 2 installed inside the housing 1, an electric heating element 3  
20 electrically connected to the power unit 6 for generating heat, and an overload protection device 4 electrically connected ~~to the~~ to the power unit 6 for preventing damage to the portable dryer 10. In the preferred embodiment, the overload protection device 4 could be a fuse or a thermal switch. However, this should not be construed to mean that only fuses  
25 could be used as overload protection devices. The portable dryer 10 further includes a switch 5 and a transformer (voltage booster) 7. The switch 5 is electrically connected to the power unit 6, the motor 2, and the electric heating element 3. The booster 7 is electrically connected to the power unit 6 for boosting the voltage level of the power unit 6 so that a greater voltage

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level is output to the motor 2 and the electric heating element 3.

5 *Please replace paragraph [0024] with the following amended paragraph:*

[0024] The power unit 6 can be a storage battery, dry-cell battery, a rechargeable battery, a fuel cell, or a micro-electro-mechanical system (MEES) (MEMS) capable of outputting electric energy. It is connected to the motor 2, the electric heating element 3, the overload protection device 4, and the switch 5 via wires 13, forming a closed circuit loop. A fan 21 is coupled to the motor 2 so that the motor 2 can rotate the fan 21 to produce airflow. The electric heating element 3 comprises a first heating filament 31, a second heating filament 33, a third heating filament 35, and a fourth heating filament 37 (in the current embodiment, the four heating filaments 31, 33, 35, 37 can each be formed by more than one heating filament). The first heating filament 31 and the second heating filament 33 first connect to the motor 2 in series, which are then connected to the third heating filament 35 and 35 and fourth heating filament 37 in parallel, the circuit thus formed is then connected to the switch 5 and the overload protection device 4. The switch 5 is provided with a movable, seesaw, or rotatable button 51 with one end protruding out of the housing 1 so that a user can control the switch 5 by using the button 51.

25

*Please replace paragraph [0026] with the following amended paragraph:*

[0026] Please refer to Figs. 2 to 4, which are circuit diagrams of a first circuit according to the present invention. In this embodiment, the switch 5

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comprises a fan shaped conductor 53 and a plurality of connecting nodes 55. The conductor 53 is coupled to the power unit 6 via a wire 13, and the  
5 conductor 53 is rotatable about a pivot 57 of the switch 5. The power unit 6 is coupled to the overload protection device 4, the four heating filaments 31, 33, 35, 37, and the motor 2, forming a closed circuit loop. When the conductor 53 is not rotated, the power unit 6 is not electrically  
10 connected to the motor 2 and the electric heating element 3 (as shown in Fig. 2) so that the motor 2 does not run and the electric heating element 3 does not generate heat.

*Please replace paragraph [0027] with the following amended paragraph:*

15

[0027] By turning the switch 5 to a first operation position (as shown in Fig. 3), the conductor 53 is rotated so that the motor 2 and the first and third heating filaments 31, 35 are electrically connected to the power unit 6, forming a closed circuit loop powered by the power unit 6. The motor 2  
20 electrically connects to the first heating filament 31 in series and to the third heating filament 35 in parallel. In this case, the second and fourth heating filaments 33, 37 are electrically ~~disconnected from~~ disconnected from the power unit 6. ~~Since 6.~~ Since the resistance of the overload protection device 4 is relatively small compared with the motor 2 and the  
25 heating filaments 31, 33, 35, 37, it is ignored henceforth. We then have:

*Please replace paragraph [0029] with the following amended paragraph:*

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[0029] the total current  $I = V(R_M + R_1 + R_3) / R_3(R_M + R_1)$ , where  $V$  is the total output voltage of the power unit 6; the 6; the voltage difference between  
 5 both ends of the motor 2 is  $V_M = R_M \cdot V / (R_M + R_1)$ ;

*Please replace paragraph [0030] with the following amended paragraph:*

10 [0030] the power generated by the motor 2 is  $W_M = R_M \cdot V^2 / (R_M + R_1)^2$   $W_M =$   
 $R_M \cdot V^2 / (R_M + R_1)^2$ ; and

*Please replace paragraph [0031] with the following amended paragraph:*

15 [0031] the total power is  $W = (R_M + R_1 + R_3) V^2 / R_3(R_M + R_1)$   
 $W = (R_M + R_1 + R_3) V^2 / R_3(R_M + R_1)$ .

20 *Please replace paragraph [0037] with the following amended paragraph:*

[0037] the power generated by the motor 2 is  $W'_M =$   
 $R_M(R_1 + R_2)^2 \cdot V^2 / (R_M R_1 + R_M R_2 + R_1 R_2)^2$   $W'_M =$   
 $R_M(R_1 + R_2)^2 \cdot V^2 / (R_M R_1 + R_M R_2 + R_1 R_2)^2$ ; and

25

*Please replace paragraph [0038] with the following amended paragraph:*

[0038] the total power is  $W' = V^2 / (R_3 R_4 -$

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$$\frac{(R_1+R_2)+(R_3+R_4)(R_M R_1+R_M R_2+R_1 R_2)}{(R_3 R_4 (R_1+R_2)+(R_3+R_4)(R_M R_1+R_M R_2+R_1 R_2))} / \frac{R_3 R_4 (R_M R_1+R_M R_2+R_1 R_2)}{R_3 R_4 (R_M R_1+R_M R_2+R_1 R_2)} W'=V^2.$$

5

*Please replace paragraph [0040] with the following amended paragraph:*

[0040] Figs. 6 to 8 illustrate circuit diagrams of a second circuit according to the present invention. The switch 5 comprises a fan shaped conductor 53 and a plurality of connecting nodes 55. The conductor 53 is coupled to the power unit 6 via a wire 13. The connecting nodes 55 are coupled to an overload protection device 4, the heating filaments 31, 33, 35, 37, and the motor 2, forming a closed circuit loop. The conductor 53 can be positioned (or shifted) to electrically contact any of the plurality of connecting nodes 55. ~~When 55.~~ When the conductor 53 is not so positioned, the power unit 6 is not electrically connected with the motor 2 and the electric heating element 3 (as shown in Fig. 6) so that the motor 2 does not run and the electric heating element 3 does not generate heat.

20

*Please replace paragraph [0041] with the following amended paragraph:*

[0041] By shifting the conductor 53 to a first operation position (as shown in Fig. 7), the motor 2 and the first and third heating filaments 31, 35 become electrically connected with the power unit 6, forming a closed circuit loop powered by the power unit 6. The motor 2 electrically connects to the first heating filament 31 in series and to the third heating filament 35 in parallel. The second and fourth heating filaments 33, 37 are electrically ~~disconnected from~~ disconnected from the power unit 6. The situation is the

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same as that shown in Fig. 3.

5 *Please replace paragraph [0042] with the following amended paragraph:*

[0042] By shifting the conductor 53 to a second operation position (as shown in Fig. 8), the conductor ~~53 electrically~~ 53 electrically connects to the power unit 6 with the four heating filaments 31, 33, 35, 37 and the  
10 motor 2. The first and second heating filaments 31, 33 are electrically connected in parallel and electrically connected to the motor ~~2 in 2 in~~ 2 in 2 in series and to the third and fourth heating filaments 35, 37 in parallel. The situation is the same as that shown in Fig. 4.

15

*Please replace paragraph [0045] with the following amended paragraph:*

[0045] Please reference Fig. 11, which shows power generated from the fourth circuit. One can calculate that  $W'/W_M=2$ , which means that the  
20 rotational speed of the motor 2 is increased by a factor of 2. The total power ratio  $W'/W=1.94$ , which means that the heat is increased by a factor of 1.94. Therefore, the electric heating device of the portable dryer can generate different amounts of heat and the motor can run at different  
25 temperatures. It is noted that the resistance  $R_2$  of the second heating filament 33 should be different to the resistance  $R_1$  of the first heating filament 31 so that the rotational speed of the motor 2 will changed while the switch 5 is turned ~~from the~~ from the first operation position ON1 to the second operation position ON2.

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*Please replace paragraph [0048] with the following amended paragraph:*

- 5 [0048] Compared to the related art, the portable dryers of the present invention are powered by its own power units, not by power cords. Thus, their usage is not limited by proximity to ~~power receptacles. Moreover to~~  
10 power receptacles. Moreover, through different arrangements of the electric heating device, the power of the motor is related to the power of the heating filaments so that different strengths of heat can be generated and the motor therein can run at different speeds ~~to allow~~ to allow the fan blow out different volumes of air and heat for the convenience of the user.